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Port Sampling Observations as Indicators of the Ratio of Sockeye to Chum Salmon Harvested in Commercial Fisheries in the South Unimak and Shumagin Islands, June 2004

by

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May 2005

Alaska Department of Fish and Game Divisions of Sport Fish and Commercial Fisheries

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	log_2, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY MANUSCRIPT NO. 05-02

PORT SAMPLING OBSERVATIONS AS INDICATORS OF THE RATIO OF SOCKEYE TO CHUM SALMON HARVESTED IN COMMERCIAL FISHERIES IN THE SOUTH UNIMAK AND SHUMAGIN ISLANDS, JUNE 2004

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ABSTRACT

A study was conducted in June 2004 to evaluate the ratio of sockeye salmon to chum salmon reported in commercial harvests within the South Unimak and Shumagin Islands June fisheries. Samples were collected from commercial fishery deliveries at salmon processing facilities in Sand Point and King Cove. The proportion of sockeye salmon in the sockeye and chum salmon catch (referred to as sockeye proportion) was calculated from the samples and fish tickets. Comparisons were made between the sample sockeye proportions and the estimated sockeye proportions derived from fish tickets. Individual binomial tests by vessel were performed to evaluate discrepancies between sample and fish ticket sockeye proportions for individual vessels. There were few vessels with significantly higher sockeye proportions on the fish tickets than estimated from the sample. Paired t-tests were also performed to evaluate if there was a consistent overestimate of the sockeye proportion recorded on the fish tickets. From the paired t-tests, there was a slight (1.1% to 2.0%) but statistically significant bias ($P < 0.05$) towards overestimating the sockeye proportion on the fish tickets. It was unclear why such a small bias might occur.

Key words: sockeye salmon, chum salmon, *Oncorhynchus,* Area M, South Unimak, Shumagin Islands, Alaska Peninsula.

INTRODUCTION

This report documents the collection and analysis of data on the ratio of sockeye salmon *Oncorhynchus nerka* to chum salmon *O. keta* in the commercial catch, during the South Unimak and Shumagin Islands June fisheries in 2004. The objective of this study was to test the accuracy of fish ticket information in estimating the ratio of sockeye salmon to chum salmon in the commercial harvest.

The South Unimak and Shumagin Islands are part of Area M, which is subdivided into the North Alaska Peninsula and the South Alaska Peninsula. The South Peninsula extends from Kupreanof Point to Scotch Cap on Unimak Island. The specific area for the study was in the Southwestern and South Unimak Districts and in the Shumagin Island Section of the Southeastern District (Figure 1). Three gear types are used during the June fisheries: purse seines (seines), drift gillnets, and set gillnets. All three gear types are used in the South Unimak June fishery, whereas only seines and set gillnets are used in the Shumagin Islands June fishery. This document uses the term “June fisheries” when referring to the combined South Unimak and Shumagin Islands June commercial salmon fisheries.

Five species of salmon occur and are harvested in the South Peninsula area, however this report is principally concerned with sockeye and chum salmon in the June fisheries. The majority of the catch during the June fisheries is sockeye salmon (Shaul et al. 2004). The majority of the sockeye and chum salmon harvest (> 60% of each species during 1993-2002) in the South Unimak June fishery is harvested by the drift gillnet fleet. The seine fleet harvests the majority of sockeye and chum salmon caught in the Shumagin Islands June fishery. Unless otherwise specified, all references to “catch” in this report are the catch of sockeye and chum salmon only.

In the South Peninsula, chum salmon usually don’t enter local spawning streams until late July or August (Burkey et al. *in press*). For this reason, chum salmon harvested in the South Peninsula June fisheries have been considered migrant stocks. Migration patterns of chum and sockeye salmon passing through the South Peninsula area have been studied, using tagging (Eggers et al. 1991) and genetic (Seeb et al. 1997) techniques. These studies attributed a substantial proportion (38%-60%) of the chum salmon harvested in the June fisheries to Northwest Alaska spawning stocks, ranging from Bristol Bay to Kotzebue.

The Alaska Board of Fisheries (BOF) has implemented a number of measures to limit the harvest of chum salmon in these fisheries. From 1986 through 2000 the June fisheries were managed with an upper limit on the number of chum salmon that could be harvested; when reached the fisheries would close for the remainder of June. Prior to the 2001 June fishery, the BOF eliminated regulations specifying an upper limit on the chum harvest, and adopted new regulations that specified specific open and closed "windows". Fishery closures or extensions of fishing periods after June 24 were determined by the sockeye to chum salmon ratio. For the 2004 June fisheries, the BOF expanded the open "windows" and removed restrictions based upon the total catch of chum salmon or the ratio of sockeye to chum salmon (Burkey et al. in press).

The study documented in this report compared the proportion of sockeye salmon in the combined sockeye and chum salmon catch as reported on commercial fish tickets to proportions in dock side samples of deliveries taken at commercial processing facilities.

METHODS

DATA COLLECTION

Samples were collected at processing facilities at Sand Point and King Cove in June 2004, during commercial fishery openings. Catch composition data were collected using a timed systematic sample design. When a fishing vessel or tender was ready to be unloaded at the salmon processing facility, the sampler would assign a letter to the vessel for identification and record it on the sample form (Appendices A1 and A2), as well as recording the sample and catch date, the vessel's name, and the sampler's name. At the processing plant in Sand Point, the fish ticket number or numbers would also be recorded on the sample form. Fish ticket numbers were not recorded on the forms for the processing plant in King Cove, because the tender deliveries usually had multiple fish tickets, often more than 10 fish tickets, associated with each delivery. At both facilities, the sampler would randomly assign a start time, and remove a sample of approximately 30 to 50 fish when the sample time was reached. The sample was enumerated by species (including chinook *O. tschawytscha*, sockeye, coho *O. kisutch*, pink *O. gorbascha* and chum salmon) and the results recorded on the sample form. The sampler would then take further samples and enumerate the samples by species every 5 to 15 minutes, depending on the estimated size of the delivery, until the catch from the vessel was completely unloaded.

The sampler would get a copy of the fish ticket or tally sheet after the fishing vessel or tender had been completely offloaded. The copy of the fish ticket or tally sheet and the sampling form were then attached to one another. The data from the data forms and catch data from the fish tickets were entered later into a database at the ADF&G Westward Region Office in Kodiak.

The weight of the catch by species recorded on fish tickets was considered accurate, although the number of each species caught was usually estimated by the crew of the fishing vessel, tender, or processing facility. The procedure used to estimate the number of each species in the catch varied between fishing vessel, tender, and processing facility. At Sand Point, when a fishing vessel or tender made a delivery the personnel from the processing facility would collect a sample of 20 or more salmon of each species during the initial offload of the vessel. Each fish was individually weighed and the average from the sample calculated. To estimate the total number of each species in the catch, the catch by weight for each species was divided by the average weight estimated from the processing facility sample for that species and delivery (Jim McCullough, personal communication, ADF&G, Kodiak).

Most deliveries to the King Cove processing facility were from tenders, and there was no specific procedure used by tender crews to estimate the number of each species in the catch. Some tender operators used brailers to unload individual fishing vessels and most fish were individually counted, though there can be error during handling. Other tenders used pumps to offload fishing vessels and followed a similar procedure as outlined for the Sand Point facility. However, the individual species average weight estimates were not always calculated for individual fishing vessels and a single average weight estimate could be used for an entire day or longer (Jim McCullough, personal communication, ADF&G, Kodiak).

DATA ANALYSIS

The ratio of sockeye to chum salmon was transformed, for analysis purposes, to the proportion of sockeye salmon in the combined sockeye and chum salmon catch or sample.

$$p_s = \frac{n_s}{n_s + n_c} \tag{1}$$

where p_s is the proportion of sockeye salmon, n_s is the number of sockeye salmon caught or sampled and n_c is the number of chum salmon caught or sampled. Throughout this report "catch" will refer to the combined catch of sockeye and chum salmon only.

Proportions were used instead of ratios for several reasons. Ratios can have large changes with small changes in species counts. For example, a count of 90 sockeye salmon and 10 chum salmon will have a ratio of 9 to 1, while a count of 99 sockeye salmon and 1 chum salmon will have a ratio of 99 to 1. Similarly, when the sample or catch was all sockeye salmon, the ratio was infinite regardless of sample or catch size. Lastly, proportions have well defined, regularly used statistical tests and distributions, which make analyses easier to perform and understand.

The Sand Point and King Cove data were analyzed independently due to differences in delivery procedures and catch areas. For each fishing vessel or tender sampled, the proportion of sockeye salmon in the catch was calculated directly from information on the fish ticket(s). Whether the proportion of sockeye salmon observed in the sample was significantly lower than the proportion of sockeye salmon recorded on the fish ticket(s) was evaluated. A single sample binomial test (Zar 1996) was used for each comparison, assuming that the proportion of sockeye salmon recorded on the fish ticket(s) was the true proportion. Hence the null hypothesis for each test was that the proportion of sockeye in the sampled delivery was equal to the proportion as recorded on the fish ticket for the delivery. The alternative hypothesis for each test was that the proportion of sockeye in the sampled delivery was less than the proportion as recorded on the fish ticket.

Performing multiple tests will increase the probability of rejecting the null hypothesis for a specified α-level when the null hypothesis is true. Accordingly, a Bonferoni adjustment to the α-level (Neter et. al 1985) was used for each sampling location (Sand Point and King Cove). A Bonferoni adjustment is made as follows:

$$\alpha_B = \alpha / k \tag{2}$$

where α_B is the Bonferoni adjusted α-level, α is the predefined α-level and k is the number of tests performed.

A paired t-test (Zar 1996) for all samples and fish tickets was also performed by location. The sockeye salmon proportion from the sample was subtracted from the fish ticket(s) sockeye salmon proportion estimate for a specific delivery. The average difference in sockeye salmon proportions from all vessels sampled at each location, was tested to determine if it was significantly greater than zero. Average differences significantly greater than zero would indicate that the proportion of sockeye salmon in the catch was overestimated by fish ticket data. If the average difference was significantly higher than zero, that would indicate there was a bias on the fish tickets towards overestimating the proportion of sockeye salmon in the catch.

RESULTS

DATA COLLECTION

Processing Plant at Sand Point

Forty eight samples were collected from 11 fishing vessels and 2 tenders at a Sand Point processing facility. In general, the larger the catch the larger the sample size (Figure 2). An average of 3.6% of the catch from each vessel was sampled, with a range of 1.0% to 14.1%. The average sample size was 83 fish (sockeye and chum salmon only), with a minimum sample size of 29 fish and a maximum of 169 fish (Table 1 and Figure 3).

The proportions of sockeye salmon in the catch were similar between the sample and fish tickets for the samples collected in Sand Point (Figure 4). From the fish tickets, the average sockeye salmon proportion was 0.631, with a range of 0.210 and 0.975. The average sockeye salmon proportion from the samples was 0.620, with a range of 0.220 and 0.966 (Table 1).

Processing Plant at King Cove

Thirty three samples were collected from 10 fishing tenders at a King Cove processing facility. In general, the larger the catch the larger the sample size (Figure 5). An average of 2.4% of the catch was sampled from each vessel, with a range of 0.6% to 13.0%. The average sample size was 147 fish (sockeye and chum salmon only), with a minimum sample size of 35 fish and a maximum of 395 fish (Table 2 and Figure 6).

The proportions of sockeye salmon in the catch were also similar between the sample and fish tickets for the samples collected in King Cove (Figure 7). From the fish tickets, the average sockeye salmon proportion was 0.811, with a range of 0.604 and 0.995. The average sockeye salmon proportion from the samples was 0.791, with a range of 0.560 and 1.00 (Table 2).

DATA ANALYSIS

Processing Plant at Sand Point

Individual binomial tests indicated that 8 of the 48 samples had sockeye salmon proportions statistically significantly lower ($P < 0.05$) than the proportions recorded on fish tickets. When the Bonferoni correction for the 0.05 α–level was used, the sockeye salmon proportion from only one sample was statistically significantly lower ($P = 0.0001$) than the respective fish ticket estimate of sockeye salmon proportion (Table 1).

Differences between sockeye proportions recorded on fish tickets and those estimated from samples were approximately normally distributed (Figure 8), indicating that a paired t-test was appropriate. The paired t–test indicated the average difference (approximately 0.011 or 1.1%) in sockeye salmon proportions between the fish tickets and samples was statistically significantly ($P=0.029$) greater than zero. The statistically significant average difference of 1.1% indicated that the fish tickets were overestimating the proportion of sockeye salmon in the catch.

Processing Plant at King Cove

Individual binomial tests by tender indicated that proportions of sockeye salmon were statistically significantly lower ($P < 0.05$) for 6 of the 33 samples than the sockeye salmon proportions recorded on fish tickets. When the Bonferoni correction for the 0.05 α–level was used, there was only one sockeye salmon proportion statistically significantly lower ($P = 0.0012$) than the respective estimate from the fish tickets (Table 2).

Differences between sockeye salmon proportions recorded on fish tickets and those estimated from samples were approximately normally distributed (Figure 9), indicating that a paired t-test was appropriate. The paired t–test indicated the average difference (approximately 0.020 or 2.0%) in sockeye salmon proportions between the fish tickets and samples was statistically significantly ($P=0.011$) greater than zero. The statistically significant average difference of 2.0% indicated that the fish tickets were overestimating the proportion of sockeye salmon in the catch.

DISCUSSION

As indicated in the Methods, proportions were used instead of ratios for several reasons. Ratios can have large changes with small changes in species counts, a sample or catch of all sockeye salmon has an infinite ratio, and proportions have well defined, regularly used statistical tests and distributions.

Individual binomial tests, after Bonferoni adjustments, indicated relatively few cases (2 out of 81 tests) of a vessel-by-vessel bias. However, paired t-tests indicated an overall bias toward the proportion of sockeye salmon in the catch. The bias was fairly small, 1% to 2%, but consistent between the two processing facilities. In terms of sockeye salmon to chum salmon ratios, the average sockeye proportion recorded on fish tickets for deliveries sampled at Sand Point (0.631) corresponds to a ratio of 1.7:1, whereas the average proportion in the samples from those deliveries (0.620) corresponds to a ratio of 1.6:1. The average of the sockeye proportion recorded on fish tickets for deliveries sampled at King Cove (0.811) corresponds to a ratio of 4.3:1, whereas the average proportion in the samples from those deliveries (0.791) corresponds to a ratio of 3.8:1.

There are several possible explanations for the overall bias. One of the most obvious explanations would be that fishermen, tender crews, or processing plant personnel were deliberately overestimating the number of sockeye salmon in the catch. However, with such a low bias, it seems unlikely that the bias was a deliberate action.

Another possible contributor to the sockeye proportion bias on the fish tickets could be the methods used in estimating the number of each species in the catch. An estimated average weight by species for individual fish ticket records was often used to estimate the number of each species caught. The methods used to estimate these average weights varied extensively between tender operators and processing facility, with no written documentation. If a non-representative sample was taken, and an average weight for either chum or sockeye salmon was estimated, the bias could be propagated as long as the inaccurate average weight was used. This could be substantial if the average weight was used for a day or more.

Lastly, the bias could also be from error in fish identification from the processing facilities personnel. Hundreds of tons of fish are sorted throughout the salmon season, and sorters in processing plants may tend to identify fish as sockeye salmon when they are unsure, since sockeye salmon are the most common species for the South Unimak and Shumagin Islands June fisheries (Shaul et al. 2004).

No past reports on similar projects from other areas of Alaska have been found. Without reviewing research from other areas, it was not possible to assess if the results of this study are inconsistent with other areas. Specifically, the error and bias estimated between the fish tickets and samples for the South Unimak and Shumagin Islands fisheries may be within normal acceptable error.

CONCLUSIONS

The two analyses indicated fishermen, tender operators, or processing facilities slightly overestimate the proportion of sockeye salmon in harvests of the South Peninsula June fisheries. While those overestimates are statistically significant, they are of a small magnitude, of only one or two percent. Because similar studies have not been done in other areas, it is not possible to tell if the discrepancies discovered in this study were consistent with possible discrepancies in other management areas.

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TABLES AND FIGURES

Table 1.-Results of sampling 48 commercial salmon fishery deliveries at the Sand Point processing facility for the proportion of sockeye salmon: sample size, proportion of sockeye salmon in the sample, proportion of sockeye salmon for the sampled delivery as reported on the fish ticket and p-value for each binomial test.

Sample	Proportion of Sockeye Salmon			Sample	Proportion of Sockeye Salmon		
Size	Sample	Fish Ticket	P-Value	Size	Sample	Fish Ticket	P-Value
79	0.709	0.803	0.0295 *	70	0.714	0.702	0.6295
115	0.713	0.737	0.3144	94	0.713	0.759	0.1774
130	0.685	0.671	0.6584	47	0.638	0.661	0.4235
151	0.510	0.428	0.9820	93	0.710	0.701	0.6142
54	0.722	0.651	0.8954	52	0.731	0.749	0.4310
53	0.660	0.544	0.9678	77	0.610	0.520	0.9561
92	0.674	0.731	0.1312	125	0.504	0.608	0.0113 *
54	0.278	0.210	0.9154	82	0.220	0.232	0.4522
107	0.383	0.239	0.9997	143	0.615	0.692	0.0311 *
69	0.696	0.671	0.7120	45	0.689	0.749	0.2186
49	0.429	0.351	0.8995	121	0.388	0.461	0.0656
43	0.395	0.531	0.0520	102	0.794	0.882	0.0073 *
66	0.439	0.506	0.1673	144	0.438	0.450	0.4175
88	0.420	0.500	0.0836	125	0.448	0.522	0.0577
49	0.571	0.577	0.5224	169	0.592	0.607	0.3681
93	0.591	0.547	0.8324	41	0.439	0.452	0.4987
76	0.658	0.556	0.9723	42	0.595	0.449	0.9801
76	0.671	0.721	0.1965	40	0.650	0.644	0.5926
67	0.597	0.771	0.0011 *	138	0.949	0.935	0.8052
98	0.653	0.736	0.0435 *	80	0.750	0.812	0.1040
68	0.809	0.815	0.4964	56	0.946	0.893	0.9473
61	0.836	0.766	0.9295	99	0.788	0.782	0.5933
29	0.966	0.975	0.5191	73	0.274	0.375	0.0454 *
71	0.831	0.780	0.8847	Averages			
99	0.657	0.817	0.0001 **	83	0.791	0.811	

* Proportion of sockeye salmon in sample significantly less ($P < 0.05$) than the proportion of sockeye salmon reported on the fish ticket, without Bonferoni adjustment.

**Proportion of sockeye salmon in sample significantly less ($P < 0.05$) than the proportion of sockeye salmon reported on the fish ticket, with Bonferoni adjustment.

Table 2.-Results of sampling 33 commercial salmon fishery deliveries at the King Cove processing facility for the proportion of sockeye salmon: sample size, proportion of sockeye salmon in the sample, proportion of sockeye salmon for the sampled delivery as reported on the fish ticket, and p-value for each binomial test.

Sample	Proportion of Sockeye Salmon				Sample	Proportion of Sockeye Salmon			
Size	Sample	Fish Ticket	P-Value		Size	Sample	Fish Ticket	P-Value	
25	0.560	0.704	0.0899		104	0.817	0.782	0.8414	
57	0.982	0.995	0.2675		284	0.739	0.770	0.1231	
170	0.694	0.715	0.2950		85	0.776	0.696	0.9618	
35	0.600	0.648	0.3311		314	0.771	0.794	0.1742	
65	0.692	0.692	0.5489		167	0.964	0.961	0.6464	
80	0.588	0.666	0.0856		86	1.000	0.981	1.0000	
258	0.690	0.632	0.9784		110	0.909	0.960	0.0131	*
60	0.950	0.985	0.0637		294	0.810	0.777	0.9240	
44	0.636	0.672	0.3616		395	0.719	0.742	0.1661	
57	0.930	0.979	0.0303	*	134	0.903	0.945	0.0351	*
194	0.732	0.644	0.9964		98	0.776	0.790	0.4019	
188	0.697	0.761	0.0270	*	163	0.748	0.843	0.0012	**
59	0.966	0.984	0.2494		238	0.945	0.963	0.1123	
91	0.670	0.739	0.0859		163	0.933	0.956	0.1111	
262	0.702	0.716	0.3299		171	0.854	0.908	0.0136	*
114	0.789	0.787	0.5576		228	0.965	0.974	0.2507	
58	0.603	0.604	0.5481		Averages				
					147	0.791	0.811		

* Proportion of sockeye salmon in sample significantly less (P < 0.05) than the proportion of sockeye salmon reported on the fish ticket, without Bonferoni adjustment.

**Proportion of sockeye salmon in sample significantly less (P < 0.05) than the proportion of sockeye salmon reported on the fish ticket, with Bonferoni adjustment.

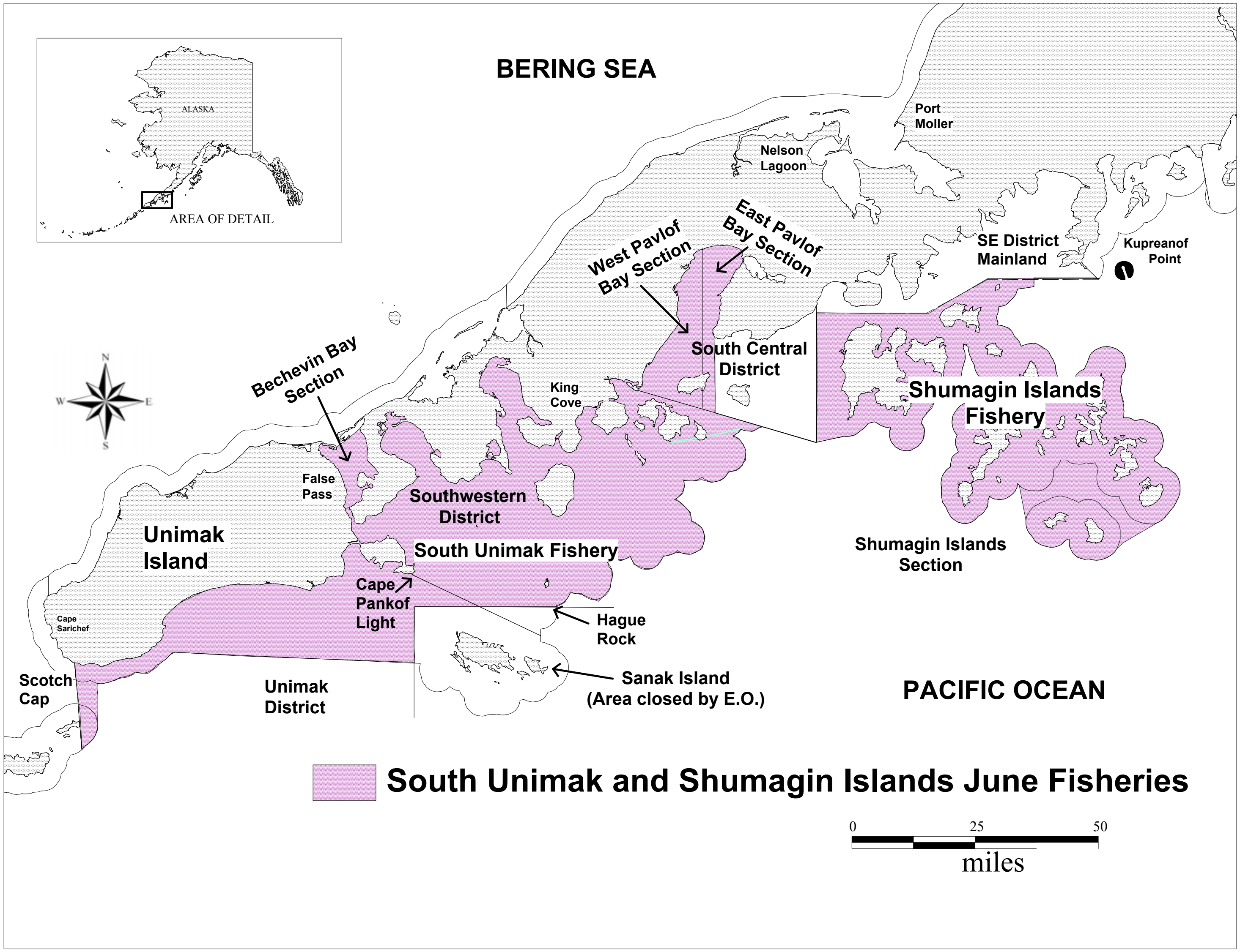

Figure 1.-Map of the South Unimak and Shumagin Islands June fisheries area.

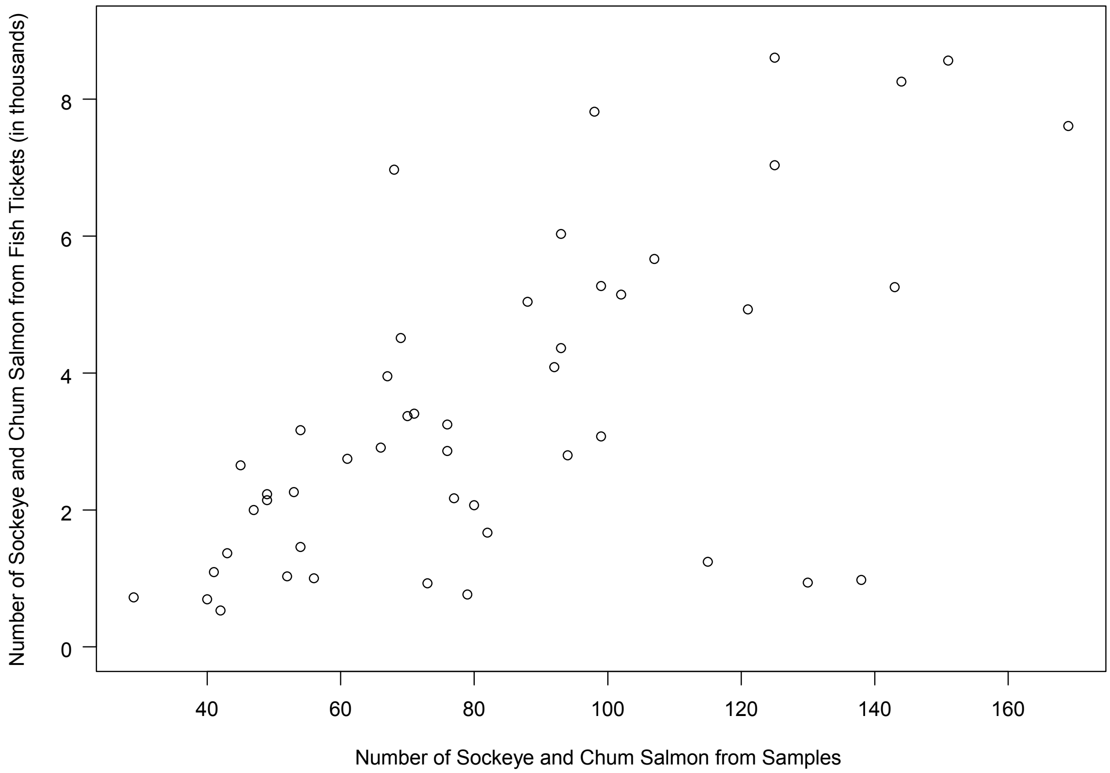

Figure 2.-Sample size versus catch of sockeye and chum salmon from vessels sampled in Sand Point, June 2004.

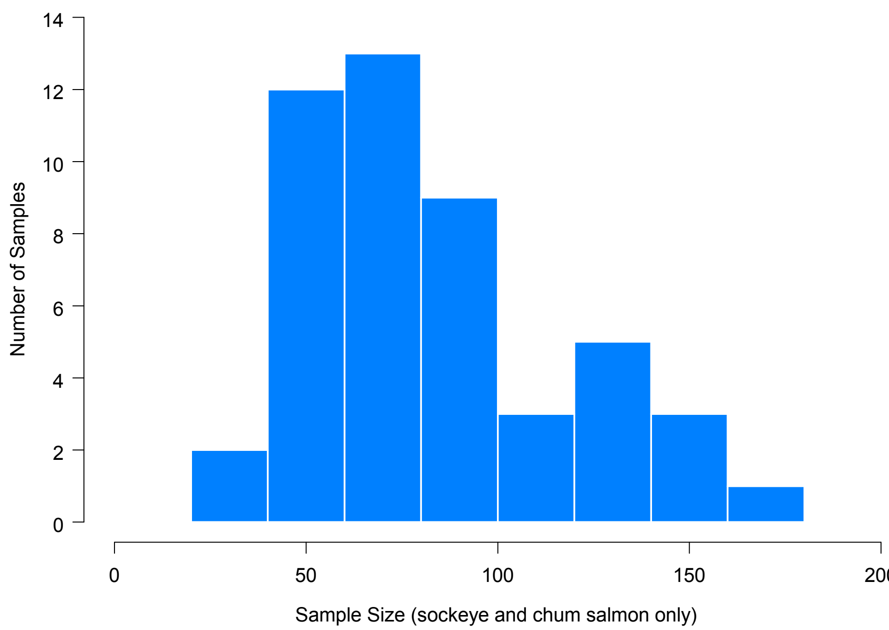

Figure 3.-Histogram of sample size of sockeye and chum salmon (combined) from vessels sampled in Sand Point, June 2004.

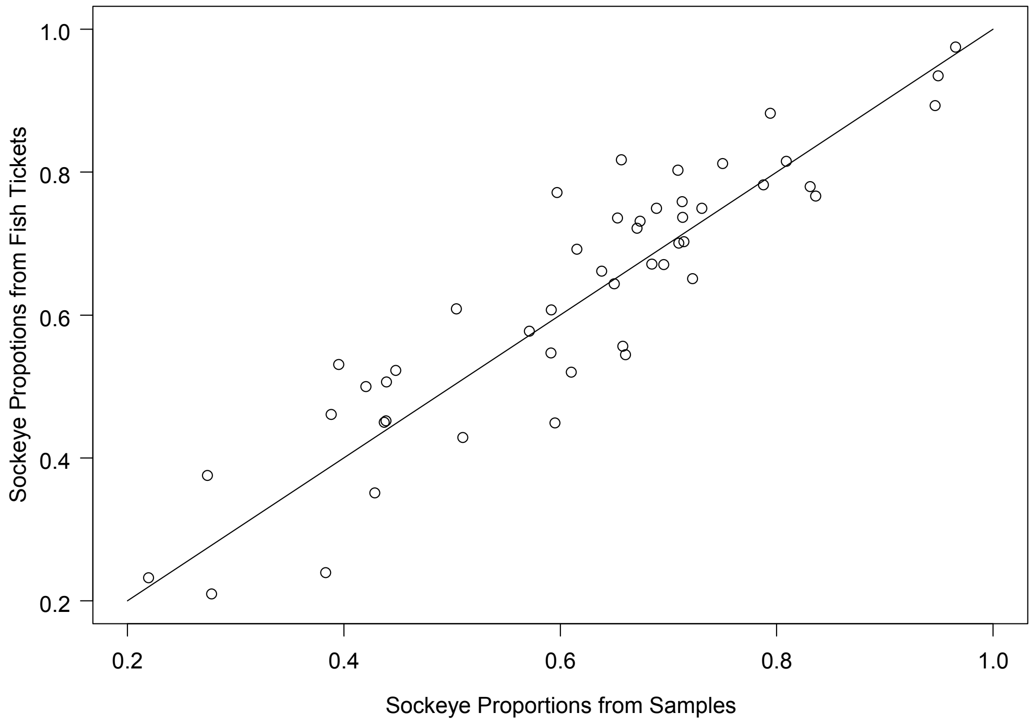

Figure 4.-Graph of sockeye proportions from the samples versus the fish tickets from vessels sampled in Sand Point, June 2004, with a line of where the two proportions are equal.

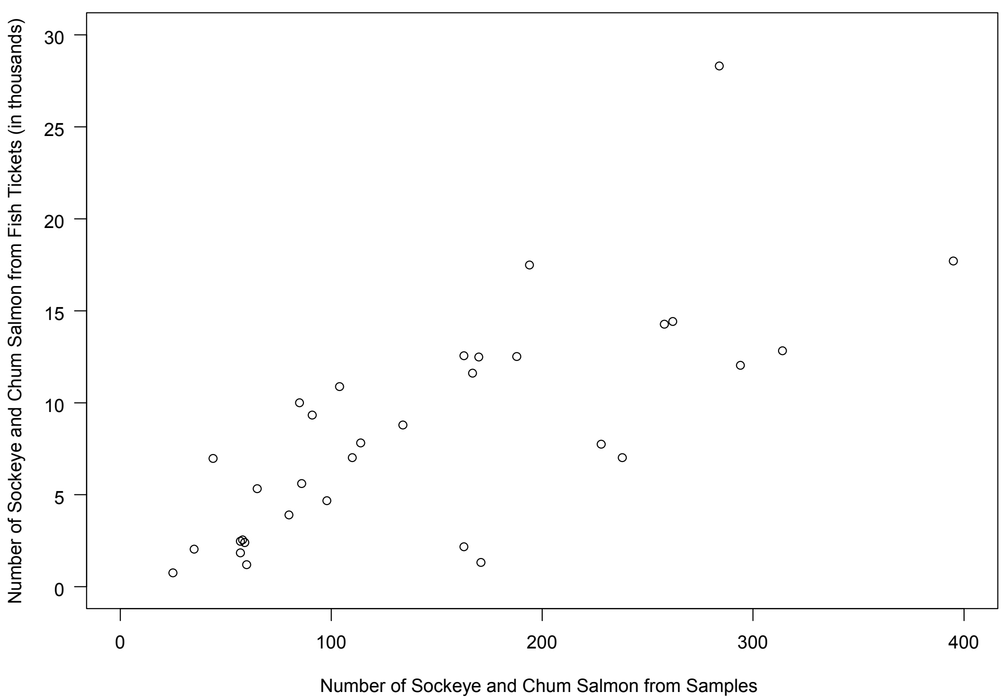

Figure 5.-Sample size versus catch of sockeye and chum salmon from vessels sampled in King Cove, June 2004.

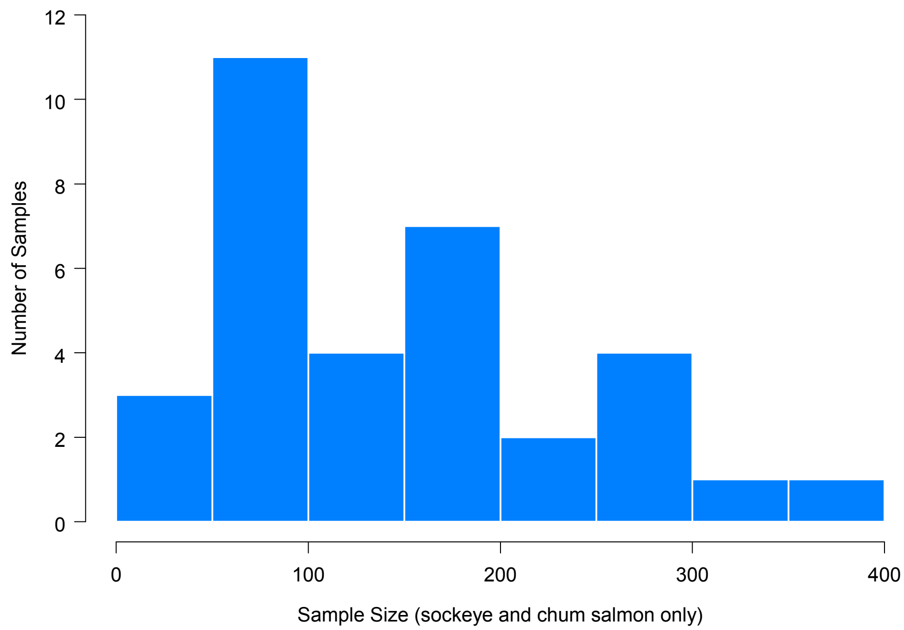

Figure 6.-Histogram of sample size of sockeye and chum salmon (combined) from vessels sampled in King Cove, June 2004.

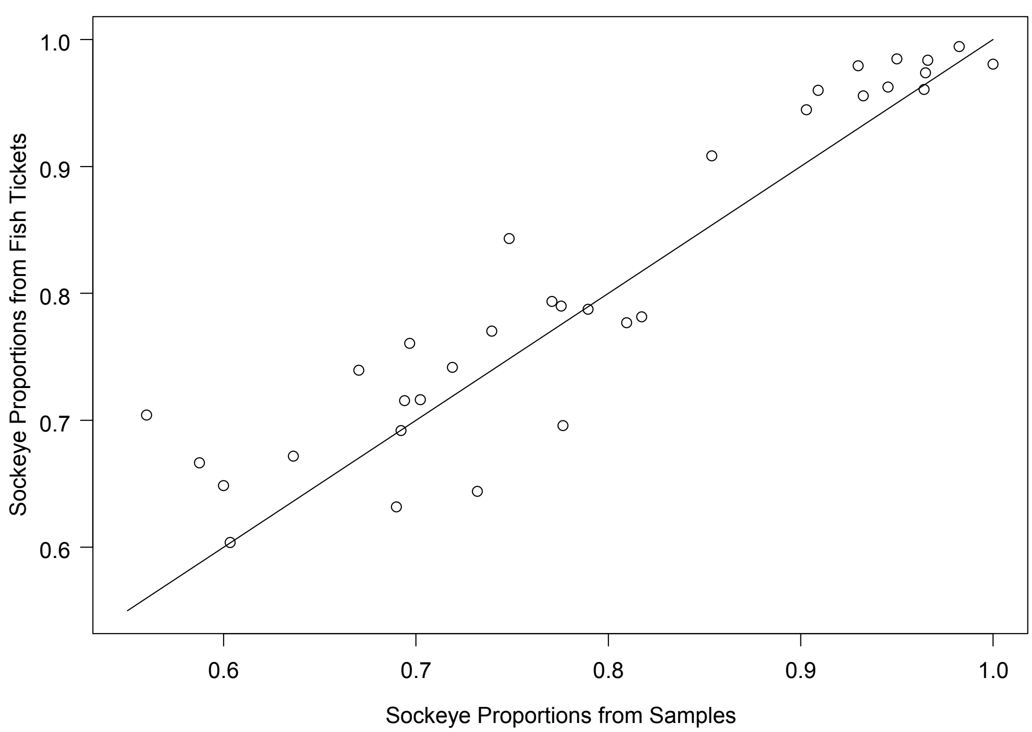

Figure 7.-Graph of sockeye proportions from the samples versus the fish tickets from vessels sampled in King Cove, June 2004, with a line of where the two proportions are equal.

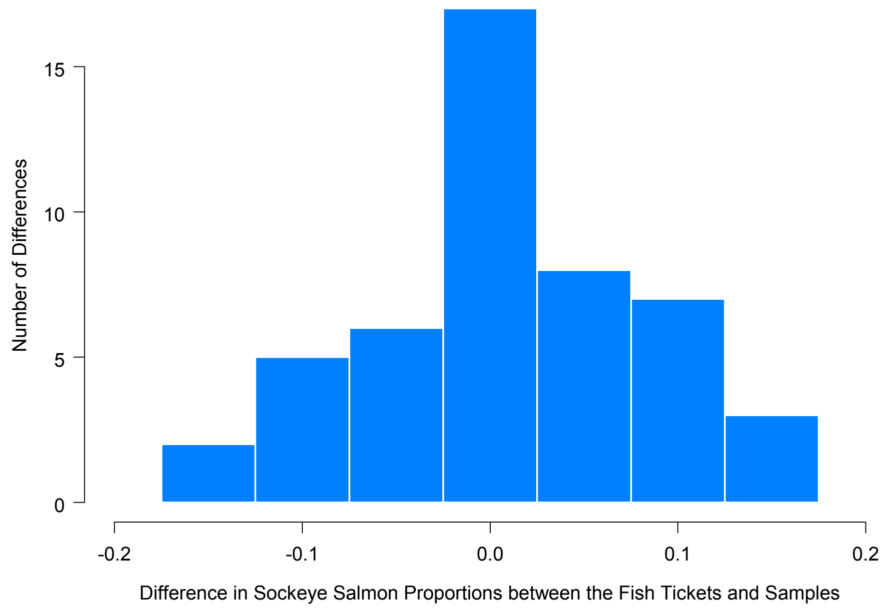

Figure 8.-Histogram of the difference in the proportions of sockeye salmon between the fish ticket and the samples for vessels delivering in Sand Point, June 2004.

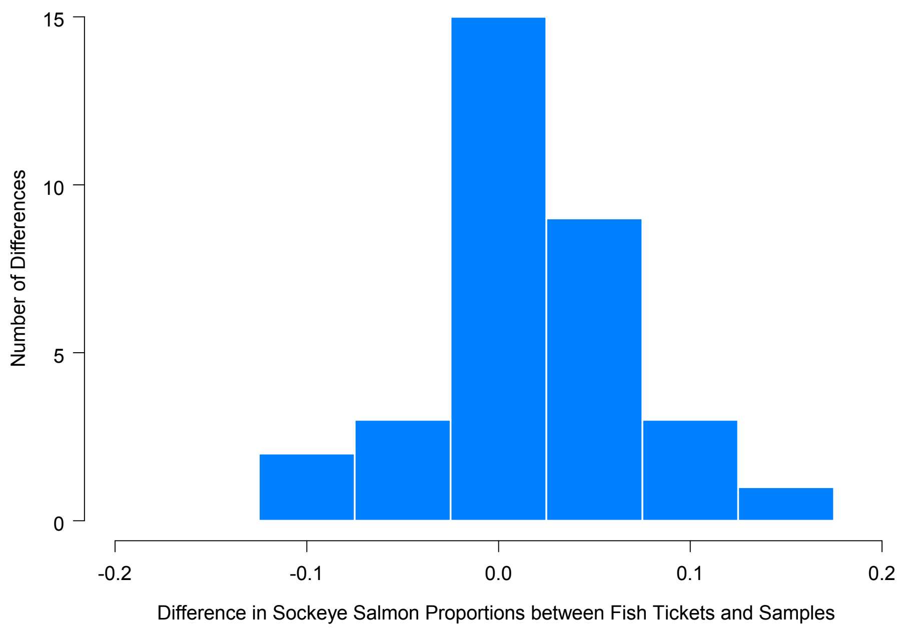

Figure 9.-Histogram of the difference in the proportions of sockeye salmon between the fish tickets and the samples for vessels delivering in King Cove, June 2004.

APPENDIX A: SAMPLING FORMS

Appendix A1.-Sampling forms used in Sand Point, June 2004.

Sampling Form for Sockeye to Chum Ratio Study of the South Peninsula June Fishery, 2004.

Sampler Name____________ Sample Date___________

Fishing Vessel Name_________________Catch Date(s)__________

Fishing Vessel Letter____

Sample Number	Total Number	Chum #	Sockeye #	Chinook #	Pinks #	Coho #

Appendix A2.-Sampling form used in King Cove, June 2004.

Sampling Form for Sockeye to Chum Ratio Study of the South Peninsula June Fishery, 2004.

Sampler Name___________ Sample Date__________

Tender Name______________________ Catch Date(s)____________

Tender Letter____

Sample Number	Total Number	Chum #	Sockeye #	Chinook #	Pinks #	Coho #